



Development of a Bi-Disciplinary Course in Forensic Science †

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INTRODUCTION

Forensic science programs and courses have traditionally been housed within chemistry departments at the college/university level, largely because the pioneers of the field were chemists who applied technology that was more chemical than biological in nature. However, with the development of such areas of study as DNA analysis, anatomical studies, and forensic entomology, it is becoming more and more important for forensic science students to have a strong biological background as well as a chemical background. Furthermore, while biology students are typically required to have extensive chemistry training as part of their major, the converse is not true for chemistry students. Therefore, it is possible that a student interested in forensic science could complete a major in chemistry and never have taken a biology class, leaving them woefully under-prepared for any type of masters program or career in forensic science immediately following graduation. Indeed, an examination of available positions in forensic science shows a large number of positions for DNA analysts for which the typical chemistry student would not be prepared without extensive biology training (<http://www.aafs.org>). Furthermore, positions for medical examiners or pathologists require extensive training in biology in addition to the continued medical training and residency programs. Therefore, it seems imperative that introductory forensic science courses adapt to these needs and be taught with a more bi-disciplinary approach in order to educate students on the whole field rather than one aspect. To that end, a new bi-disciplinary Forensic Science course was developed at Elmhurst College. This course was team-taught by a biology and a chemistry professor so that students would obtain a thorough understanding of the field and techniques used by both biologists and chemists. A description of this new version of a forensic science course follows, focusing on the addition of biology to a traditionally chemical course, the conclusions drawn upon completion of

the course, and changes to be made in the future.

PROCEDURE

The historical nature of forensic science programs being housed within chemistry departments was initially observed when attempting to choose a textbook for the course. The chemical aspects of forensics dominated a large majority of texts, with limited to no information on the biological aspects of the field. The required textbook was chosen based on its introductory nature and more equal distribution of biology and chemistry (1). However, it was still determined that additional biological information would be added to compensate for missing information. The material was divided equally between the faculty so that each would teach her specialty. Some of the major biological topics covered included basic information on cells and tissues; microscopy, specifically focusing on the various types of microscopes available and situations in which a scientist would use each microscope; basic anatomy instruction to aid in the topics of pathology, anthropology, and odontology; and lessons on entomology, serology, and hair. Finally, there was an extensive discussion of DNA analysis describing the various techniques used to analyze and sequence DNA. It was necessary to precede this discussion with a basic genetics lesson in order to describe the structure and function of DNA as well as differences in mitochondrial versus nuclear DNA (syllabus provided in Appendix 1). In all, it was imperative to have a biology instructor with a broad training in anatomy, cell biology, and genetics in order to provide thorough lessons in all of these topics. Finding an instructor with all of this expertise is difficult and the instructor of record was still woefully under-prepared for the lesson on entomology. Therefore, an ideal situation would be to include several faculty members with expertise in all areas in order to provide the best instruction possible. However, it is understood that at smaller liberal arts institutions this is often not possible.

The teaching faculty designed weekly lab activities since it was also observed that virtually all forensic science laboratory manuals had a chemistry focus with little to no biological activities. Each week students learned various techniques used by forensic scientists in the field to examine evidence (Appendix 1). The lab activities culminated in a final

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†Supplemental materials available at <http://jmbe.asm.org>

project in which students were divided into groups and given a “crime scene” to investigate. The faculty planted evidence of both a biological and chemical nature at each scene and asked students in other courses to provide fingerprints as potential suspects on record. Furthermore, additional evidence was planted which was not meant to be a part of the crime to determine if students would be able to distinguish which items were relevant. The students worked together as a group over a three-week period to collect and analyze their evidence and then determine a likely suspect. They were required to maintain the chain of custody while collecting and analyzing their evidence. Once a potential suspect was identified, students were able to collect additional information from the suspect such as writing samples, hair, or other identifying information to further their investigation. After they had completed their analysis, students were asked to write a paper describing the evidence that led to their determination of a potential suspect.

CONCLUSION

Overall, this course was considered a success with students learning the basics of forensic science at both a biological and chemical level. Students seemed particularly interested in the biological aspects of forensics, especially since they have seen shows on television such as “Bones” or “CSI,” which have a strong focus on these topics. However, there were a few things that will be changed for subsequent offerings of the course, all of which had to do with the culminating crime scene investigation. First and foremost, the instructors noted that the students were determined to find someone guilty at any expense. Students would often ignore evidence that clearly indicated someone else if it did not match other evidence they had that they deemed more important. One of the groups had evidence planted to implicate no one, yet they still found someone guilty based on bad analysis and a certainty that someone needed to be guilty. Some students forgot proper chain of command

and did not have their evidence signed in after they had used some samples for analysis. This resulted in the hard lesson of having all of their evidence and the case thrown out, which, in turn, affected the final grade on their paper. It was determined that the crime scene was an excellent opportunity for active learning and needs to be emphasized more in future offerings of the course. The optimal situation would be to have two crime scenes throughout the semester so that the students are able to apply what they learn from mistakes made during the first crime scene to a second scene. If possible, it would also be interesting to work with faculty and students involved in the Mock Trial course on campus so that students can use role-playing to incorporate a trial based on the evidence into the final crime scene investigation. In conclusion, the addition of a strong biology focus in a forensics course seems especially important in this day and age and it is hoped that this type of course will become more prevalent in the future to better prepare students for careers in the field.

SUPPLEMENTAL MATERIALS

Appendix I: Syllabus for bi-disciplinary forensic science course

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